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To the Editor:

Moreno-Macias and Romieu[1] reviewed the possible role of antioxidants in asthma, but they did not properly cover randomized controlled trials (RCTs) on vitamin C and asthma. Mitochondrial respiration and inflammatory cells are an endogenous source of oxidative stress,[1] and therefore, the pulmonary effects of vitamin C might be most pronounced when a person exercises or suffers from infections.

Three RCTs examined the effect of vitamin C on asthmatic participants suffering from exercise-induced bronchoconstriction (EIB).[2] The pooled relative effect estimate revealed a 48% reduction (95% CI, 33% to 64%) in postexercise FEV_1 decline when 0.5 to 2 g/d of vitamin C was administered before the exercise test.[2] One of the trials reported that on the placebo day, 100% (20 of 20) of the adolescent participants suffered from EIB, whereas on the vitamin C day, only 50% (10 of 20) of them suffered from EIB ($P < .001$).[3] The 3 RCTs included a total of only 40 participants, but the studies were carried out over 3 different decades and on 2 different continents, and the inclusion criteria differed. Still, all 3 trials were consistent with vitamin C halving the postexercise FEV_1 decline. Therefore, the effect estimate may be valid for several other asthmatic patients who suffer from EIB.

A systematic review found 2 RCTs that provided information on the potential pulmonary effects of vitamin C in sufferers of common cold–induced asthma.[4] A trial in Nigeria examined asthmatic patients whose asthma exacerbations resulted from respiratory infections (N = 41). A vitamin C dose of 1 g/d lowered the incidence of severe and moderate asthma attacks by 89% (95% CI, 52% to 98%; based on 23/19 vs 3/22).[4,5] A cross-over study in former East Germany on patients who had infection-related asthma (N = 23) found that 5 g/d of vitamin C decreased the prevalence of bronchial hypersensitivity to histamine by 52 percentage points (pp) (95% CI, 25 pp to 71 pp; based on 91% during the placebo phase vs 39% during the vitamin C phase).[4,6]

None of the 5 above-mentioned double-blind placebo-controlled RCTs was mentioned by Moreno-Macias and Romieu,[1] who mainly focused on case-control and cohort studies. They referred to a 4-month RCT on 154 British asthmatic patients that found that the FEV_1 level was not influenced by 1 g/d of vitamin C.[7] This British RCT implies that vitamin C supplementation does not influence pulmonary functions in patients with stable asthma; however, vitamin C may beneficially affect pulmonary functions of some asthmatic patients under certain forms of acute stress, such as when they endure heavy physical activity or suffer from a viral respiratory tract infection.

Given the safety and low cost of vitamin C, more research is needed on the possible effects of vitamin C on bronchial obstruction and airway hyperresponsiveness caused by exercise and the common cold.

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REFERENCES

1. Moreno-Macias H, Romieu I. Effects of antioxidant supplements and nutrients on patients with asthma and allergies. J Allergy Clin Immunol 2014;133:1237-44.
2. Hemilä H. Vitamin C may alleviate exercise-induced bronchoconstriction: a meta-analysis. BMJ Open 2013;3:e002416.
3. Cohen HA, Neuman I, Nahum H. Blocking effect of vitamin C in exercise-induced asthma. Arch Pediatr Adolesc Med 1997;151:367-70.
4. Hemilä H. Vitamin C and common cold-induced asthma: a systematic review and statistical analysis. Allergy Asthma Clin Immunol 2013;9:46.
5. Anah CO, Jarike LN, Baig HA. High dose ascorbic acid in Nigerian asthmatics. Trop Geogr Med 1980;32:132-7.
6. Schertling M, Winsel K, Müller S, Henning R, Meiske W, Slapke J. Action of ascorbic acid on clinical course of infection related bronchial asthma and on reactive oxygen metabolites by BAL cells [in German]. Z Klin Med 1990;45:1770-4, English translation available at: http://www.mv.helsinki.fi/home/hemila/T9.pdf. Accessed September 12, 2014.
7. Fogarty A, Lewis SA, Scrivener SL, Antoniak M, Pacey S, Pringle M, et al. Oral magnesium and vitamin C supplements in asthma: a parallel group randomized placebo-controlled trial. Clin Exp Allergy 2003;33:1355-9.

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Reply

To the Editor:

We thank Hemilä[1] for the additional information provided and thoughtful comments on the role of vitamin C supplementation. In our review, our major focus was on the long-term effect of antioxidant supplements and nutrients on the incidence of asthma and allergy and the evolution of these diseases. Although we report findings from recent systematic reviews and meta-analyses on this topic, we did not systematically review all small randomized controlled trials conducted in asthmatic groups exposed to asthma stressors. The studies reported by Hamilä support the beneficial role of vitamin C supplementation in change in lung functions after exposure to exercise-induced bronchoconstriction or asthma attack related to infection. These are interesting results and are in line with results of a randomized controlled trial presented in our review on the role of antioxidant supplementation among asthmatic children (n = 158) exposed to high levels of air pollution (a powerful oxidant).[2] We agree with Hemilä that more research is needed on the potential effects of vitamin C in particular and antioxidants in general on respiratory health among susceptible subjects with acute exposure to asthma stressors (exercise-induced bronchoconstriction, common cold, air pollution, and other environmental exposures).

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REFERENCES

1. Hemilä H. Vitamin C and asthma. J Allergy Clin Immunol 2014;134:1216.
2. Romieu I, Sienra-Monge JJ, Ramirez-Aguilar M, Tellez-Rojo MM, Moreno-Macias H, Reyes-Ruiz NI, et al. Antioxidant supplementation and lung functions among children with asthma exposed to high levels of air pollutants. Am J Respir Crit Care Med 2002;166:703-9.

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